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Assessment of seasonal forecast skills of temperature and precipitation: a comparison of 5 different models over the Mediterranean region

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Seasonal forecasts are increasingly employed as sources of information on the expected evolution of climate in the few months ahead by various end-users. This study provides an overall assessment of the skills of the main seasonal forecast systems available in the Copernicus Climate Data Store (C3S) in representing temperature and precipitation anomalies at the monthly time scale. The focus area is the Mediterranean, a densely populated region identified as a hotspot for climate change, where seasonal forecasts could be useful to a variety of economic sectors, including water management, hydropower production, agriculture.

In this study, seasonal forecast systems issued by 5 European institutions (ECMWF, Météo-France, UKMO, DWD, CMCC), together with two different Multi-Model Ensembles (MME) derived from them, have been analysed. The added value of these forecast systems with respect to simpler forecast approaches based on climatology and persistence has been investigated.

Different deterministic (Anomaly Correlation Coefficient) and probabilistic scores (Ranked Probability Score, Continuous Ranked Probability Score and Receiver Operating Characteristic Curve) have been employed to obtain an overall assessment of the quality of the forecasts (as of Murphy, 1993 and WMO, 2018), using ERA5 dataset as a reference. We performed the analysis using 6-month forecasts starting in May and November to reproduce the following summer and the winter seasons.

In general, temperature patterns and respective skill scores are better reproduced than those regarding precipitation. The anomaly correlation coefficients for MME reach the best agreement values for each season and variable except for winter temperature. Different behaviours are found for the different skill scores; their high spatial variability suggests that smaller regions could perform better for a single variable or starting date. Seasonal forecast systems, despite some limitations, show an added value with respect to simple forecast approaches based on the climatology or persistence.